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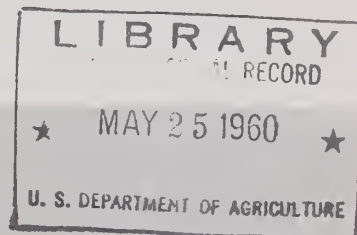
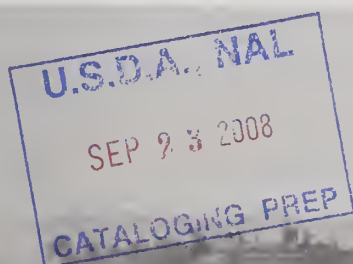
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California's Timber Industries

some facts and figures

by Harold L. Baker



PACIFIC SOUTHWEST
FOREST AND RANGE
EXPERIMENT STATION

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Most of the data presented are from published and unpublished Forest Service sources.

³ CALIFORNIA'S TIMBER INDUSTRIES -
SOME FACTS AND FIGURES

By
Harold L. ² Baker ^{1b}

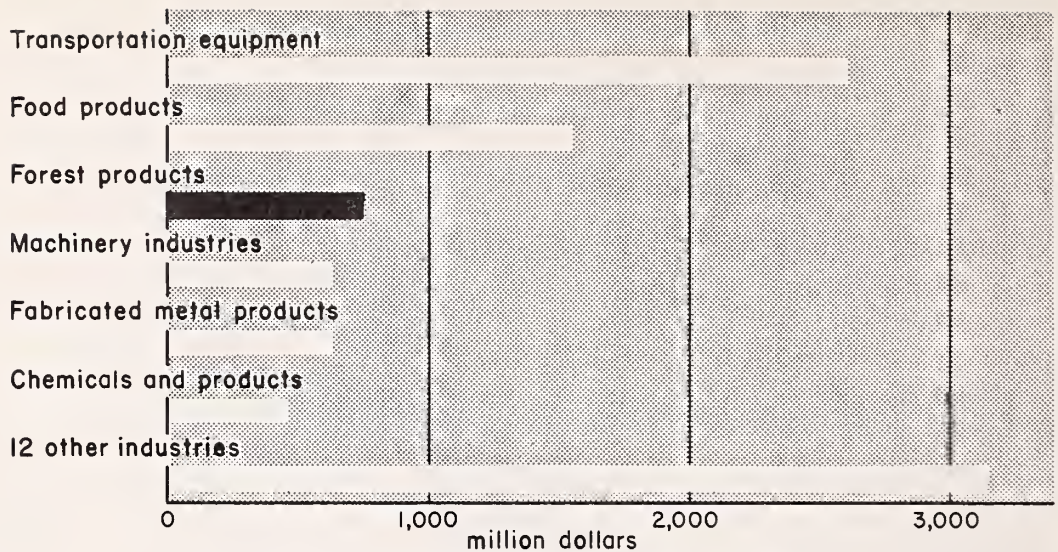
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1/ Formerly Forest Economist, Pacific Southwest Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture, now with the Land Study Bureau of the University of Hawaii.

CONTENTS

	<u>Page</u>
INTRODUCTION	1
THE LUMBER INDUSTRY	4
The Pine Industry	6
The Redwood Industry	10
The Douglas-fir Industry	12
THE PLYWOOD AND VENEER INDUSTRY	15
THE WOOD FIBER INDUSTRY	16
OTHER WOOD PRODUCTS INDUSTRIES	18
OUTLOOK	19



Source: Economic Survey Series No. 6a, 1957-1958. California Chamber of Commerce

Figure 1 - Value added by manufacturers for principal industries in California, 1955.

Table 1. --Annual payrolls, employment, and average annual earnings per employee, by major industry group, California, 1955

Major industry group	Annual payrolls	Number of employees	Annual earnings per employee
	<u>Million dollars</u>	<u>Thousands</u>	<u>Dollars</u>
Transportation equipment	1,517	288.6	5,256
Food products	624	149.9	4,163
Forest products			
Lumber & wood products	303	58.9	5,144
Paper & allied products	103	21.8	4,725
Furniture & fixtures	128	25.5	5,020
Total	534	106.2	5,028
Machinery industries	415	74.4	5,578
Fabricated metal prod.	375	75.8	4,947
12 other industries	2,031	434.4	4,675
All industries	5,496	1,129.3	4,867

U. S. Census--Census of Manufactures

CALIFORNIA'S TIMBER INDUSTRIES--

SOME FACTS AND FIGURES

By Harold L. Baker

Forest industries were among the earliest manufacturing enterprises established in California. The first steam-powered sawmill was established at Bodega in 1843, and it was in the tail race of Sutter's sawmill at Coloma that John Marshall made his historic gold strike in 1848. The Gold Rush created an immediate demand for lumber, and many new mills sprang up during the next few years, not only in the mining areas but also near San Francisco and Humboldt Bays. By 1855 about 80 sawmills were operating in the State, one-third of them steam-powered and the remainder water-powered.

For the past decade California has been the second largest producer of lumber in the Nation. Only Oregon produces more. In 1956 about 16 percent of the Nation's lumber production and substantial quantities of other timber products, were produced in California.

This production accounts for many millions of dollars worth of commodities each year. In 1955, value added by manufacture in these industries (lumber, paper, furniture, and allied products) totaled 879 million dollars (fig. 1). Industries wholly or partially dependent on the timber resource accounted for 9 percent of the total value added by manufacture in the State. Forest industries ranked third, behind transportation equipment and food products.

Forest products also account for a sizable share of the State's jobs. In 1955, manufacturing facilities for converting wood to finished products furnished employment for 10 percent of all workers engaged in manufacturing in California and accounted for about 10 percent of the annual payrolls of manufacturers. Forest industries provide 106,000 jobs and furnish the major means of livelihood for close to 400,000 persons. Even though employment in forest industries is often seasonal, particularly in logging operations, average annual earnings compare favorably with incomes in other manufacturing industries in California. In 1955, the average annual income of employees in the lumber and wood products industries was \$5,144.

Figure 2 - Location of major forest industries in California, 1956.

LEGEND

- Sawmills
- ▲ Plywood and veneer plants
- Pulp and board plants
- Boundary between regions

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1959

- 2 -

At the end of their first century of growth, the forest industries had developed two principal elements: the lumber industry, with its pine, redwood, and Douglas-fir segments, and the plywood industry. Each of these has its characteristic products, location, organization, and economic problems. Taken together, these two major industries accounted for about 95 percent of the volume of forest products manufactured in 1956.

Supplementing these two are several smaller forest industries. They include the manufacture of pulp, poles and piling, mine timbers, fence posts, shingles and shakes, hewn crossties, tan bark, fuelwood, container veneer, charcoal, and a variety of split products. Though small, many of these industries are especially important because of the species or size of raw material they use, or because of their potentiality for expansion.

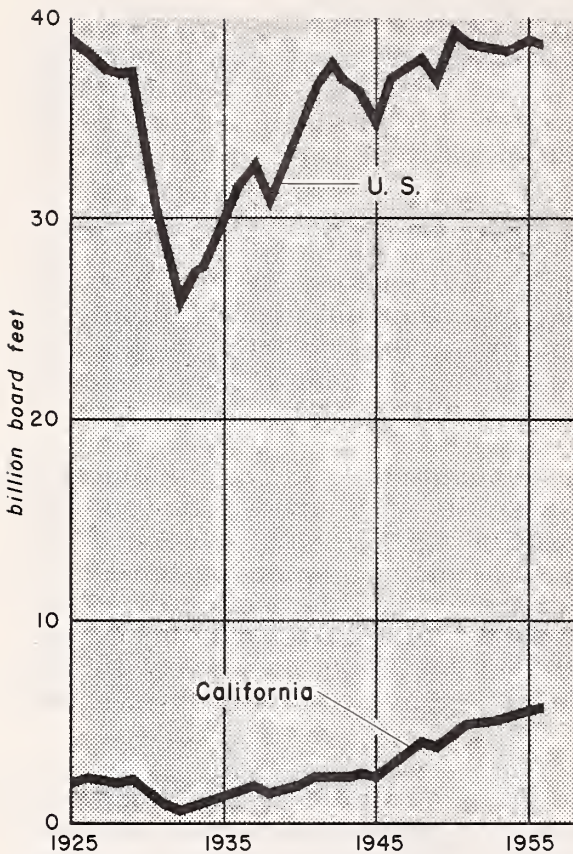
The lumber industry is concentrated in coastal Humboldt and Mendocino counties, in Siskiyou, Trinity, and Shasta counties of northern interior California, and along the west slopes of the Sierra Nevada (fig. 2). These areas contain much of the State's remaining old-growth timber of the most desired species. The plywood and veneer industry is concentrated in coastal Del Norte, Humboldt and Mendocino counties and scattered at several inland locations. The pulp and fiberboard industry is scattered around the State.

Industries' dependence on an adequate timber supply and changes in that supply is obvious. In 1953, the volume of saw-timber in California was estimated at 360 billion board feet (International 1/4-inch log scale). This material is located on 17 million acres of commercial forest land distributed throughout the State.

The future of the State timber supply will be affected by the factors of cut and growth. Average annual net total growth, based on the decade preceding 1953, was 2.9 billion board feet per year. The annual cut in 1952 was 5.7 billion board feet, largely from old growth, giving a balance of cutover growth of 2.8 billion board feet. However, the annual cut fluctuates. In 1956, 7.0 billion board feet of timber was harvested. Cut has declined since then. Growth also is changing; probably it is increasing as more of the old-growth timber is removed.

Forest land ownership also has a bearing on supply. More than one-half of the commercial forest land is in public ownership. The timber industries own only about one-fifth of the forest area, and the remainder is in farm and other private holdings.

THE LUMBER INDUSTRY



Source: The Demand and Price Situation for Forest Products

Figure 3 - Lumber production in California and the United States, 1925-1956.

California reached 5.9 billion board feet, and California had risen to a position of importance in the Nation's lumber economy.

Besides supplying a large part of the Nation's lumber, the California industry is a key producer of certain species. Redwood, sugar pine, and in some respects ponderosa pine--for a long time staples of the California lumberman--are specialty type woods. For this reason the State's lumber industry has been an important supplier of these woods in national markets. Even in the years between the two World Wars, about a third of all California lumber production was marketed outside the State, principally in the Middle West.

In 1956, 54 percent of the shipments from mills reporting to the California Redwood Association were to destinations outside the State. These mills produced 60 percent of the redwood lumber output.

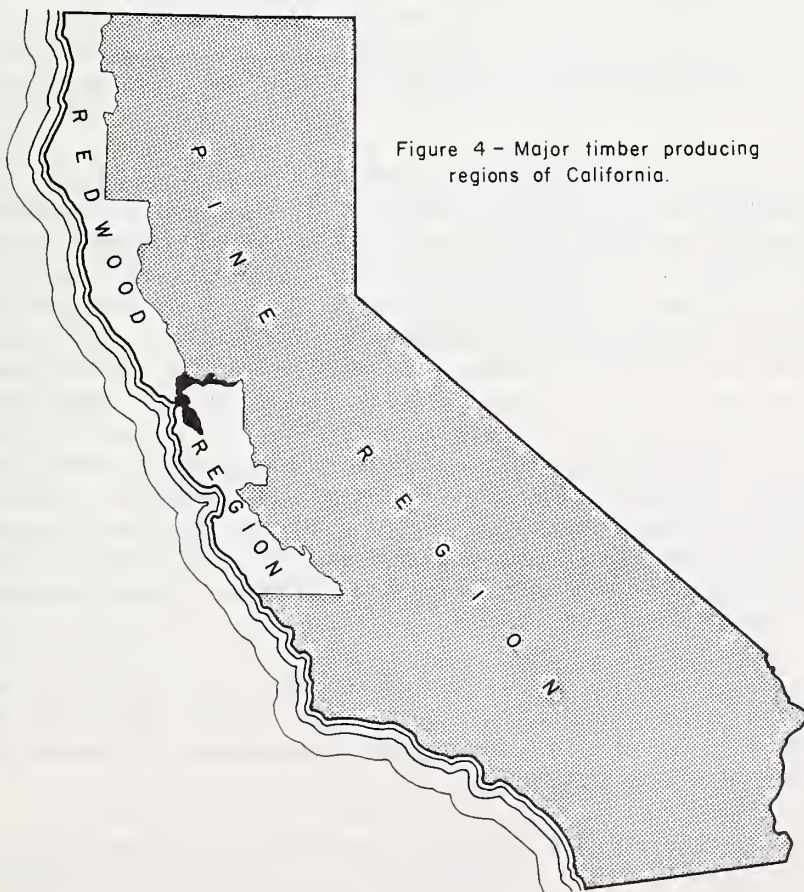
Lumbering is by all odds the most important of the forest industries. From the start, it expanded production moderately but steadily until the early 1940's, save for the marked fluctuations in output between the two World Wars (fig. 3). By the early 1940's production averaged about 2-1/3 billion board feet per year. Upwards of 85 billion board feet of lumber had been manufactured in the State over the hundred years ending in 1945.

Then came a dramatic change in the trend. Beginning in 1946 the output of lumber increased more rapidly than it ever had before, almost doubling in 5 years. Between 1946 and 1956 almost 50 billion board feet of lumber was produced--about three-fifths as much output as in the entire preceding century. By 1956 lumber production in

Reports by California members of the Western Pine Association in 1956 showed a little over 50 percent of their shipments were to external markets. These member mills accounted for about 75 percent of the pine output of the Pine Region in 1956.

Because the Association mills tend to have widely developed marketing organizations, the figures shown are not fully representative of average conditions. However, they do serve to further emphasize the importance of the California lumber industry to the rest of the United States.

Differences in historical development, industry organization, markets, competition among species of timber, and distribution of species in the various parts of California's forest area have resulted in the development within the State of a lumber industry composed of three distinct segments: the pine industry, the redwood industry, and the Douglas-fir industry. These industries are closely associated with--but not identical to--the timber producing regions of the State (fig. 4), the pine industry with the Pine Region and the redwood and Douglas-fir industries with the Redwood Region. The Douglas-fir industry includes some Douglas-fir mills in Trinity and Siskiyou counties which are part of the Pine Region.



THE PINE INDUSTRY

The pine industry of California is the largest of the three segments of the lumber industry in the State. In 1956, it accounted for about 43 percent of total California production. About 35 percent of all U. S. ponderosa and sugar pine production originates in California, making it the largest single segment of the western pine industry.

Production was 2.5 billion board feet in 1956. This production was almost twice the 1.4 billion output in 1929. Within the past 3 decades the rate of growth in lumber production has been somewhat less for the pine industry than for the State as a whole. The rapid increase in the growth of the Douglas-fir industry during the past 15 years has obscured the increase in the pine and redwood industries.

Other important changes in the character of the pine industry have accompanied the rise in output. Before 1942 ponderosa pine and sugar pine made up more than 80 percent of all lumber cut by the pine industry. Other species, such as Douglas-fir, white fir, and incense-cedar, were cut in relatively small amounts, and large merchantable volumes of these species remained standing on logged-over areas. In 1956 the proportion of pine in the industry's total cut fell to 52 percent. The once-avoided white fir became the second species in volume handled by the pine industry (fig. 5).

This shift in species composition of the cut is significant. It means that a large proportion of the industry's increase in production has been achieved through development of the so-called secondary species rather than through an expanded output of the preferred species. Of the 1.05 billion board-foot increase in annual output experienced between 1929 and 1956, only 111 million feet per year was an increase in pine production. The remaining 939 million was all in species other than pines. Between 1929 and 1941 annual output in the pine industry increased 319 million board feet, of which 291 million was an increase in pine production. The big shift came after 1941. From that year until 1951, pine industry production increased 809 million board feet, but only 1 million of this was in ponderosa and sugar pine. An increased cut of white fir and Douglas-fir made possible the rapid expansion of the pine industry in this period.

Since 1951 annual output of the pine industry has declined, from 2.59 billion to 2.51 billion. This change is the net result of a decline in ponderosa pine production, greater than the rise in the production of fir and other species.

Changes in the numbers and sizes of sawmills have also taken place (fig. 6). To produce the 1,464 million board feet annual cut in 1929 required 137 pine mills. In 1956, 340 mills cut

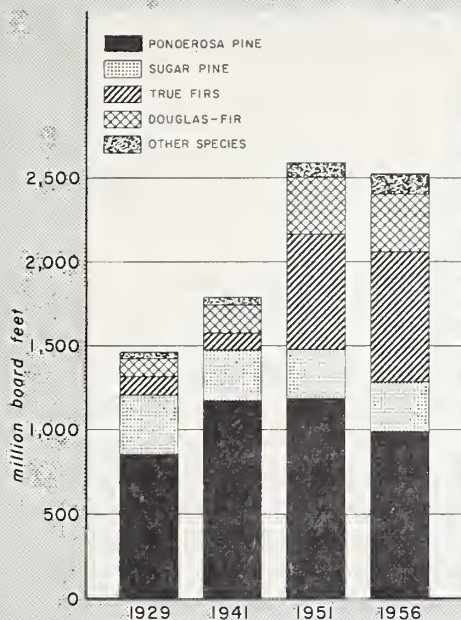


Figure 5 - California pine industry production by species in selected years.

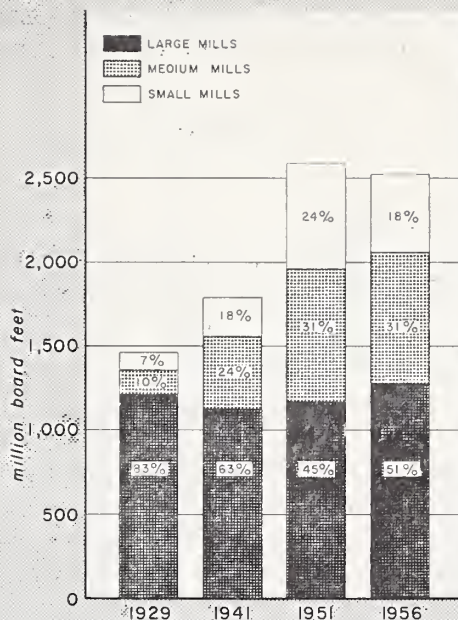


Figure 6 - California pine industry production by mill size class in selected years.

2,514 million board feet. Average production per mill thus decreased from 10-2/3 million board feet per year in the earlier year to only 7-1/3 million board feet per year in 1956. Few of the new mills are as large in size as the larger pre-war mills. Moreover, some very large pre-war operations have been discontinued. An important feature of the change is that "large" mills (those cutting 25 million feet or more per year) produced 83 percent of the total industry output in 1929, 63 percent in 1941, only 45 percent in 1951, and 51 percent in 1956. Over the same period "medium" sized mills (10 to 25 million feet per year) increased their share of the cut from 10 percent in 1929, to 24 percent in 1941, and 31 percent in 1951 and 1956.

This reduction in mill size is related to a changing timber resource. To sustain a mill of 30 to 40 million feet per year output requires access to a large volume of timber. So long as heavy virgin stands were available, such volumes could be obtained from within a reasonable distance of the mill. However, as lower-quality old growth and lower-volume young stands are drawn upon, very large sawmills are hard pressed to find economical log supplies unless they own a substantial supply. Medium sized mills, on the other hand, can be supplied by a smaller timber volume. Thus the change in mill size helps bring the industry into balance with the long-term timber supply. It is not clear whether past trends in the average size of mill will continue or whether, as a result of integration, the optimum average size has already been reached.

Markets for the pine industry of California have been built primarily around long established uses for ponderosa pine. The major end-uses of ponderosa pine in 1928 and 1948 were as follows:

<u>Use</u>	<u>1928</u>	<u>1948</u>
	- - Percent - -	
Manufacture		
Sash, doors, and general millwork . .	24	27
Containers and packages	34	23
Other	<u>13</u>	<u>6</u>
Total	71	56
Construction and other uses	29	44

Most striking of the market shifts is the decline in the wooden container market. Over the 20-year period, the total volume of ponderosa pine used for packaging declined by 2-3/4 percent while the general level of pine consumption was increasing 43 percent. The downward trend in the box lumber market has intensified since 1948, declining by about one-third from 1952 to 1958.

Historically, the box market has played a vital role in the operation of the California pine industry. It provided a nearby and economical outlet for the large proportion of lower grade ponderosa pine lumber produced by the industry. But rapidly rising lumber prices and the development of competing forms of containers suitable for use in packaging California's fruit and vegetable crops have led to wholesale substitution of other types of package for the wooden box. So long as construction activity remains high and continues to absorb substantial quantities of lower grade pine boards, the full effects of the changed market picture are not likely to be felt. But a slackening of demand in the construction market could lead to a critical problem for the industry.

The geography of the pine industry's markets is also changing. Although market data are not available for all California pine mills, reports of the Western Pine Association covering most of the State's larger pine mills are indicative of trends affecting California pine producers. The proportion of reported production distributed within the State declined from 73 percent in 1946 to 47 percent in 1956. The evidence suggests that, despite the big expansion in output which took place between these two years, the absolute amount of pine industry lumber consumed in California may actually have declined. If so the withering of the box market is undoubtedly a major cause.

During the decade 1946-56, markets in the East and Midwest were expanding notably. Together, these areas took 60 percent of all shipments reported by the Western Pine Association in 1956, compared with only 38 percent in 1946. One of the reasons

for these changes in market geography appears to be the growing strength of the western pine industry in competition with southern pines. Eight percent of the 1956 Western Pine Association shipments were to the South, which for decades was the largest timber producing region in the United States. This southern market was not confined to such fringe areas as Texas and Kentucky; in 1956 reported shipments into the eight southern coastal states, stretching from Virginia to Louisiana, exceeded 150 million board feet.

Another significant development in the California pine industry has been a gradual shift in the location of production. In 1929 five counties (Siskiyou, Lassen, Tuolumne, Plumas, and Fresno) accounted for 70 percent of the industry's output. By 1956 these same five counties were producing 38 percent of the pine industry total although their aggregate cut was only slightly more than that of the earlier year. The new development has moved generally to the north and west, and has centered in the Shasta-Trinity, Yuba-Plumas, and Amador-Calaveras areas. Between 1929 and 1956 the increase in production in these six counties amounted to 908 million board feet, about 85 percent of the total increase in industry output over the period.

Another indicator of this geographic diffusion is the fact that 18 out of the 30 pine-producing counties now cut 50 million board feet or more per year. In 1929 only nine counties had an industry of this magnitude. Evidently, the California pine industry has passed beyond the pioneer stage, where large untapped areas of the region await industrial development. It has entered a new period in which timber procurement problems will focus largely on accessible areas. The last decade and a half of history of the California pine region has been characterized by a major internal migration. The opportunity to continue to solve the industry's raw material problems by such migration now appears to be largely past.

THE REDWOOD INDUSTRY

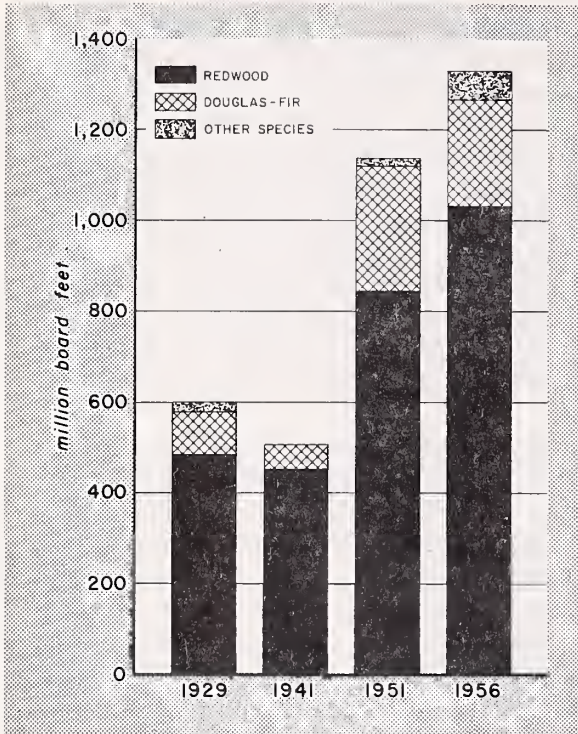


Figure 7 - Redwood industry production by species in selected years.

The redwood industry, long synonymous with the lumber industry in the Redwood Region, was founded over a century ago. Up to 1905 it grew more rapidly than pine lumbering and was the largest forest industry in the State. But between 1905 and 1946 the scale of redwood operations was fairly stable, and the pine industry replaced the redwood in first rank. From 1946 to 1951 the redwood industry grew rapidly, and by 1956 accounted for 23 percent of the State's lumber output.

Lumber production by the redwood industry was 1,329 million board feet in 1956--730 million board feet greater than annual production in 1929 (fig. 7). The number of mills cutting significant amounts ^{2/} of redwood lumber increased from 32 to 240. In the same period, the pine industry increased production

by 1,050 million feet while about doubling the number of mills.

The more modest expansion in redwood lumbering probably stems from the nature of the redwood timber ownership. Much of the resource is in large holdings closely tied to established milling facilities, and a good deal of the stumpage is held as a reserve for future cutting. Not only is there less redwood timber than pine, but also the stumpage available on the open market to support expansion of redwood lumbering is much more limited than in the pine or Douglas-fir industries.

^{2/} Twenty-five percent or more of annual production is redwood.

The redwood industry has responded to the recent broadening of markets by some increase in production of "white woods" (principally Douglas-fir), but a substantial proportion of the recent growth in output has been the result of a greater production of redwood. Of the 730 million board foot increase in annual output between 1929 and 1956, 548 million was redwood. Virtually all of this increased redwood production was achieved after the end of World War II.

Redwood markets emphasize those uses where durability, straightness of grain, availability in large sizes, and other distinctive properties of the timber are important. In 1948 major end uses of redwood were:

<u>Use</u>	<u>Percent</u>
Manufacture	
Millwork	7
Tanks	6
Other	7
Total	<u>20</u>
Construction & other uses	80

Some trend toward greater use for manufacture has shown up, but in general the end uses of redwood have not changed markedly in recent years.

Geographically redwood markets, like those for pine, have expanded outside the State. For example, in 1945 mills reporting shipments to the California Redwood Association showed 38-1/2 percent of their shipments going to destinations outside California. In 1956 interstate shipments accounted for 53 percent of the total. Redwood markets are particularly well developed in Ohio, Illinois, Texas, and adjacent states.

Unlike the pine industry, the redwood industry has not shifted its location of production a great deal. Such expansion as has taken place has been rather general over the producing region, except that newer mills have tended to be established further inland. (fig. 8). This stability reflects the narrow geographic range as well as the location and size of redwood timber, the need for large industrial plants to be located on major transportation routes, and the well stabilized pattern of control over timber supply, with only 5 owners each controlling more than 50,000 acres of timberland in 1953, and 10 more holding between 20,000 and 50,000 acres.

Nevertheless, the industry has spread out. Humboldt County, long the center of the redwood industry, usually accounted for two-thirds of all redwood lumber production before World War II. Now it accounts for less than half the total (42 percent) and adjacent Mendocino County is beginning to rival Humboldt as a supplier of redwood. Thus, in the redwood industry, too, the last decade has brought a new stage of development in which few timber areas are so remote from a sawmill as to be considered inaccessible.

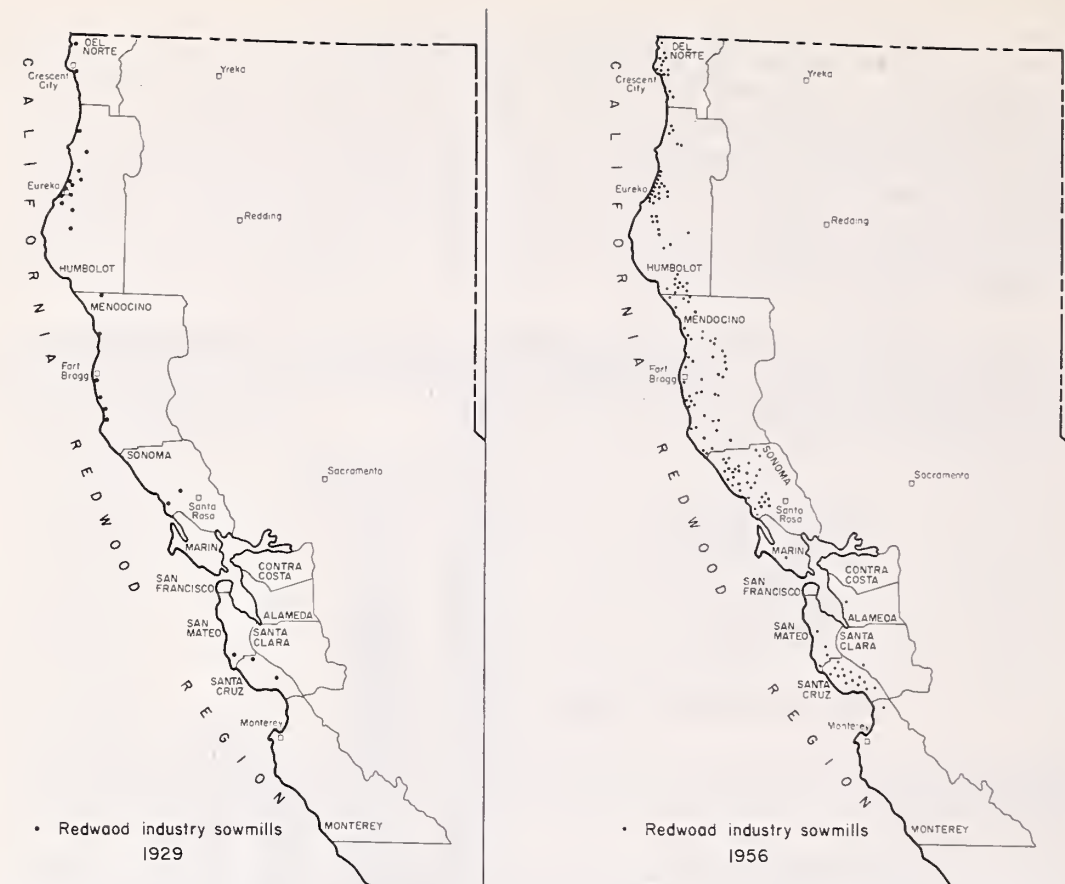


Figure 8 - Despite the growth in output, the general location of redwood industry production has remained quite stable.

THE DOUGLAS-FIR INDUSTRY

The Douglas-fir industry is a newcomer to California. Before 1941 Douglas-fir normally accounted for about 10 percent of total State production. Most of this was cut in redwood and pine industry sawmills from Douglas-fir timber growing as a minor component in pine and redwood stands. Few mills made Douglas-fir the basis of their operations and few were located within the forest areas where Douglas-fir is the principal species. California Douglas-fir was "submarginal" in the face of the ample low-cost supply of this species flowing from Washington and Oregon to nationwide markets.

The lumber shortage of the war years permanently altered this situation. Beginning in 1941 Douglas-fir production rose both in actual output and in proportion of total cut. Some of this increase resulted from expansion in the established pine and redwood industries. But the really spectacular rise which began

in 1946 resulted primarily from new plants designed to cut Douglas-fir, first in the Redwood Region and later in the adjacent north-western edge of the Pine Region. By 1956, 267 sawmills were engaged primarily in the manufacture of Douglas-fir (fig. 9). Production by such mills had grown in 10 years from 130 million to 2,038 million board feet per year.

Naturally enough the Douglas-fir industry in California was closely tied geographically to the established pine and redwood industries at its inception. Transportation, equipment, and manpower were all most readily available on the margins of the Douglas-fir areas where they adjoined existing pine or redwood operations. At first much of the production of Douglas-fir was by mills set up to cut redwood and pine. As time goes on this industry seems likely to occupy a more and more independent position.

Markets for Douglas-fir lumber differ from those for pine and redwood both in respect to end-use and geography. Douglas-fir markets center on construction uses. Manufacturing and container uses are distinctly secondary outlets. Moreover, California Douglas-fir is in direct competition with the established fir producers of the Pacific Northwest. As a result, out-of-state markets are much less important than to pine and redwood producers. It is estimated, for example, that more than three-fourths of the output of the Douglas-fir industry in Humboldt County is marketed within California, where the domestic mills have important transportation advantages over their northwest competitors.

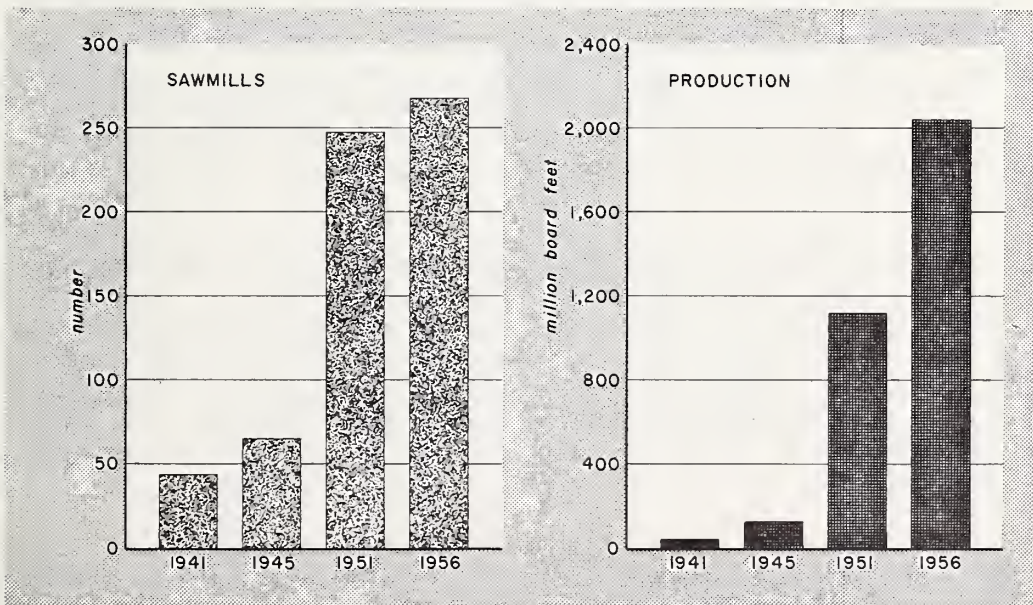


Figure 9 - The Douglas-fir lumber industry in California grew from virtually nothing to a major industry within a decade.

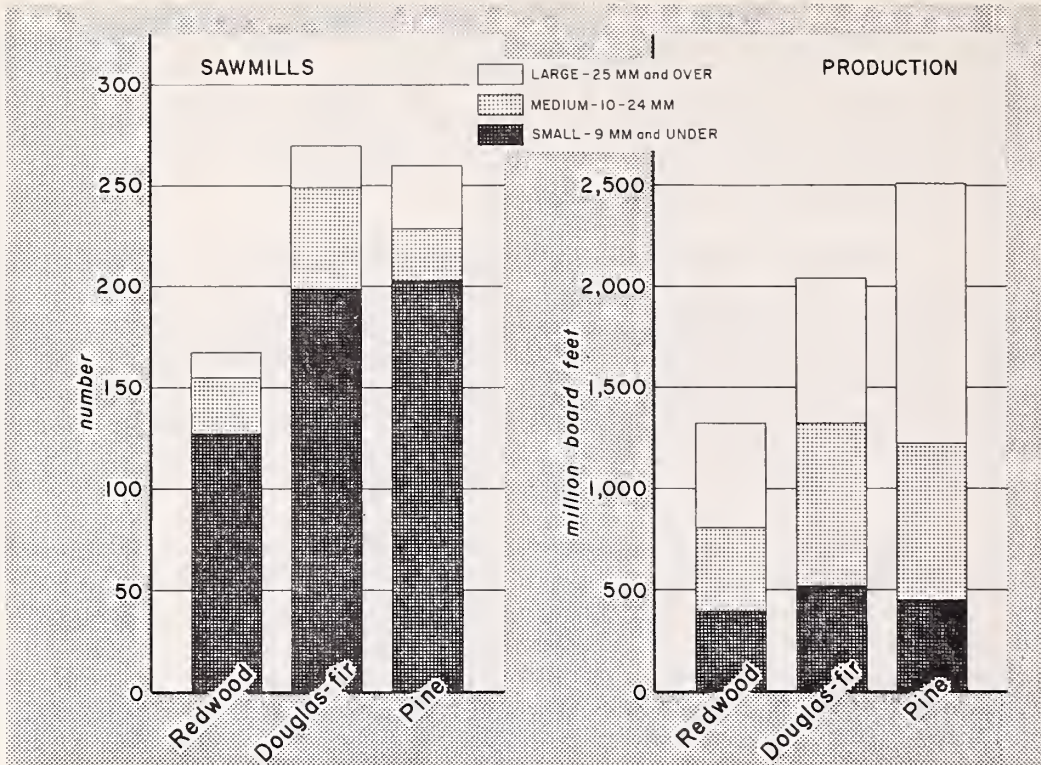


Figure 10 - Number of sawmills and lumber output in the three segments of California's lumber industry, 1956.

The Douglas fir lumber industry controls relatively little of its basic timber resource through large scale ownership. In 1948 only 13 percent of the commercial forest land in the Douglas-fir zone was owned by timber operators or holding companies. Fifty-one percent was in public ownership and 36 percent was owned by ranchers, farmers, and other non-industrial owners. In contrast, 59 percent of the redwood zone and 30 percent of the commercial forest in the Pine Region was owned by timber operators.

Because of the timber ownership pattern in the Douglas-fir zone, independent sawmills, both large and small, have had ample opportunity to acquire raw materials from both public and private owners. As capital requirements for lumber manufacture are rather low, entry into the California Douglas-fir industry has been relatively easy in recent years. This circumstance is the basic explanation of the industry's surprising ability to expand production.

At the same time, the outlook for this industry is less stable than that for redwood and pine. Fewer Douglas-fir operators are in a position to plan for permanent lumber production. Small and medium mills occupy a more important role both numerically and in total output than in the other segments of the lumber industry (fig. 10). As a result the Douglas-fir industry's structure favors

expansion well beyond the capacity of the resource for permanent production. Also, it provides opportunity for a sharp reduction in number of operators and volume of output if the timber supply is reduced.

The Douglas-fir lumber business is in direct competition with the softwood plywood industry both for markets and raw material. Plywood has made substantial inroads into established construction industry markets for such uses as concrete forms, roof and wall sheathing, floors and sub-flooring, and for interior applications. Furthermore, the better grades of sawmill logs are suitable for plywood manufacture, and the product value per unit of wood used is higher for plywood than it is for lumber. As a result, Douglas-fir sawmills meet stiff competition for the better grades of logs. In recent years, markets have been generally strong for all grades of Douglas-fir lumber, so the effects of such competition have been minimized. But any decline in demand for lumber would weaken the ability of Douglas-fir sawmills to compete with the plywood industry for high grade logs.

THE PLYWOOD AND VENEER INDUSTRY

Among the major producers of forest products in California, plywood is an "infant" industry. However, it is a lusty infant which has grown from 2 plants in 1946 to 21 plants in 1956, with an annual production of 725 million square feet (3/8-inch basis). In California, plywood has been manufactured from ponderosa and sugar pine since 1911. However, only three plants are now producing pine plywood. Most of the production is Douglas-fir. Even though Douglas-fir plywood was not manufactured here until after World War II, it accounted for 93 percent of the State's total plywood production in 1956.

This growth has been part of a general expansion in the softwood plywood industry. In 1946 there were 2 plywood plants in California and 33 in Washington and Oregon; total industry production was 1.4 billion square feet (3/8-inch basis). In 1956 there were 21 plants in California, 99 in the Pacific Northwest, 1 each in Idaho and Montana; industry output was 5.4 billion square feet. Continued industry-wide growth will depend largely on the success of plywood manufacturers in expanding their markets and enlarging the supply of peelable logs available to the industry. During the past decade the industry has established an impressive record in dealing with both of these problems.

Failure to solve these problems could have a greater impact on the State's timber economy than the size of the plywood industry might suggest. Its labor requirements per unit volume

of logs are more than twice those needed to manufacture finished lumber. As a result, the plywood industry employs a significantly larger number of workers, per thousand feet of timber consumed, than the lumber industry.

A new development in the California industry is the construction and operation of green veneer plants. These plants peel veneer which is shipped green to other operators for drying and laying up in plywood panels. Douglas-fir is the major species used for this purpose. At the beginning of 1950, only one green veneer plant operated in California. In 1954 there were twelve. By 1956, 17 green veneer plants were operating in the State, indicating a continuing rise in this part of the industry.

THE WOOD FIBER INDUSTRY

The California wood pulp industry is currently relatively small but may have great potential for future development. In 1956 pulp manufacturers consumed 66 million board-feet of logs (gross scale)--about 1 percent of the round wood used by all forest industries. This modest activity does not indicate the relatively large recent growth of the industry because it does not show the expanded use of wood chips as a source of raw material. Before 1948 use of pulpwood was restricted to less than half a million board feet per year, used in the manufacture of roofing materials. In 1956, there were 7 fiber using plants in California--1 pulp mill, 1 hard-board plant, and 5 roofing felt plants. Also in operation were two particle-board plants.

In 1956 two other plants were constructed--a pulp mill at Red Bluff and a particle board plant at Arcata. These plants are now in operation.

Until recently the wood pulp industry by-passed California as a site for its development. Technical factors related to wood and water requirements, ready availability of raw materials, skilled labor, and market outlets in other sections of the nation all combined to concentrate the industry's growth in other areas.

Now economic conditions have become more favorable to establishment of primary pulp production within the State. The better plant sites in areas outside the State are occupied, and more sites are still needed. Moreover, a growing market for pulp products is concentrated in California.

Initially the California pulp industry relied on round wood for raw materials. Much of this was sawlog size material of too low quality for use in sawmills or of species such as white

fir, whose market as lumber was narrow. Additional log supplies were obtained from thinning young stands and from material too small for utilization as lumber.

Then the industry began to utilize chipped mill residues from sawmills and plywood plants. These residues have now become a principal source of raw material supply for the pulp industry. In 1952, 33 percent of the raw material used by the pulp industry (8 million cubic feet) came from mill residues. Yet, this raw material composed only 10 percent of the coarse mill residue used in the State and but 3 percent of the coarse mill residue produced. In more recent years, the quantity of mill residues used has increased substantially. Estimate for 1956 shows that mill residues now supply about 60 percent of the raw material for wood pulp in California. Even so, real opportunities exist for expanded use of the available material by new fiber-using plants.

Besides reducing waste through use of mill residues, the pulp industry has had a favorable effect in reducing the amount of residual material left in the woods after logging. Sometimes the pulpwood market has permitted salvage of substantial volumes of material left on areas previously harvested for sawlogs. Of greater importance has been the reduction in logging residues wherever it has been possible to market pulpwood at the same time that sawlogs were being removed. Opportunities for use of logging residues have slackened somewhat because of the increased use of mill residues. Also, present pulpwood prices and transportation costs are such that the economic impact of the industry on standards of utilization in the woods has been confined to areas within a 100 to 150 mile radius of San Francisco Bay.

Several factors favor further expansion of the California pulp industry. Among these are a favorable raw material supply, proximity to an expanding market for pulp products, and the long-term rising trend in nationwide demand for pulp. But to achieve such expansion, the problem of securing the necessary quantities of process water and avoiding stream pollution will need to be solved. Recent technological advances indicate that progress is being made toward solution of this problem.

Furthermore the industry will need control of a sufficiently large supply of timber to support large-scale mill operations over a long period of time. The proportion of public ownership and the stable nature of most private timberland ownership suggests that growth of the pulp industry will require integration with already established large-scale sawmill and plywood operations or outright purchase of timberland holdings adequate to support a pulp operation.

All of these factors affecting the development of the pulp and paper resources of California are discussed in a recently completed report by the State Water Pollution Control Board. This report shows that there is opportunity for considerable expansion of the pulp and paper industry in California without creating a water pollution problem.

OTHER WOOD PRODUCTS INDUSTRIES

Several other wood products industries are established in the State (table 2). In the aggregate their production is relatively minor compared to lumber or plywood. None of them appears to have the potential for future growth that the pulpwood industry has. None of them constitutes a major industry on a Statewide basis. But each is significant either in local areas or in relation to particular forest conditions.

Poles and piling are cut from Douglas-fir and ponderosa pine, and piling from eucalyptus. The market for these products fluctuates considerable from year to year but is persistent. About 24 million board feet of timber was used for these purposes in 1956. The market helps in the management of young-growth timber because it provides an outlet for certain classes of material produced in the course of thinning operations. Only few companies purchase, process, and market poles and piling; they control little or no forest land and purchase needed timber largely from farmers and other non-industrial owners.

Cooperage and container veneers have been produced for many years. The single cooperage plant in Humboldt County, which operated largely on Douglas-fir, went out of business in 1955. Several veneer plants cut packaging material from ponderosa pine. These industries used about 4 million board-feet of logs in 1956. Much of their raw material comes from sawlogs. Another component of the industry makes considerable use of veneer bolts cut between branch whorls of second growth pine. These veneer plants are usually small and operate independently of sawmills.

A small but long-established industry manufactures shingles and sawed shakes. Redwood and sugar pine are the species of timber used, mostly redwood. About 4 1/2 million board feet of logs was used for this purpose in 1956, considerably less than the volumes used in other post-war years for which records are available. Shingle and sawed shake production is centered in Humboldt and Mendocino Counties and is typically a small scale industry. For example, in 1956 some 26 manufacturers were in business, using on the average less than 175 thousand board feet of timber per year apiece.

Table 2. --Output of timber products, California, 1956

Product	Quantity	
	MM board feet	Percent
Sawlogs for lumber	6,353.3	90.5
Veneer logs and bolts	531.7	7.6
Pulp logs and bolts	51.2	0.7
Firewood	25.4	0.4
Poles, piling, and mine timbers	24.6	0.4
Split products (except shakes)	23.8	0.3
Shingle and shake bolts and box bolts	4.5)	0.1
Charcoal wood	4.0)	
Total	7,018.5	100.0

Source: California Forest Survey Release No. 35

The redwood split products industry has a greater output than the shingle and sawed shakes industry. In it, specialists produce a variety of products: stakes, fenceposts, paling, and similar items. Operations are carried out largely by hand, and the industry provides a part-time occupation for some residents of the redwood area.

Other small forest industries include those producing mine timbers, fuelwood, charcoal, and tanbark. Total production of these industries amounts to about one-half of one percent of the timber products output in California.

OUTLOOK

California is well endowed with timber resources, compared to most other states, and the timber industries are likely to continue to form an important part of the California economy for many years to come. Lumber is by far the major timber product and undoubtedly will continue to dominate the production picture, but the production of veneer and plywood has been growing rapidly and the pulp industry is off to a good start. These recent trends toward diversification of output are likely to continue, accompanied by further integration of production processes, as the timber industries adjust to changing market and timber resource conditions in the future.

